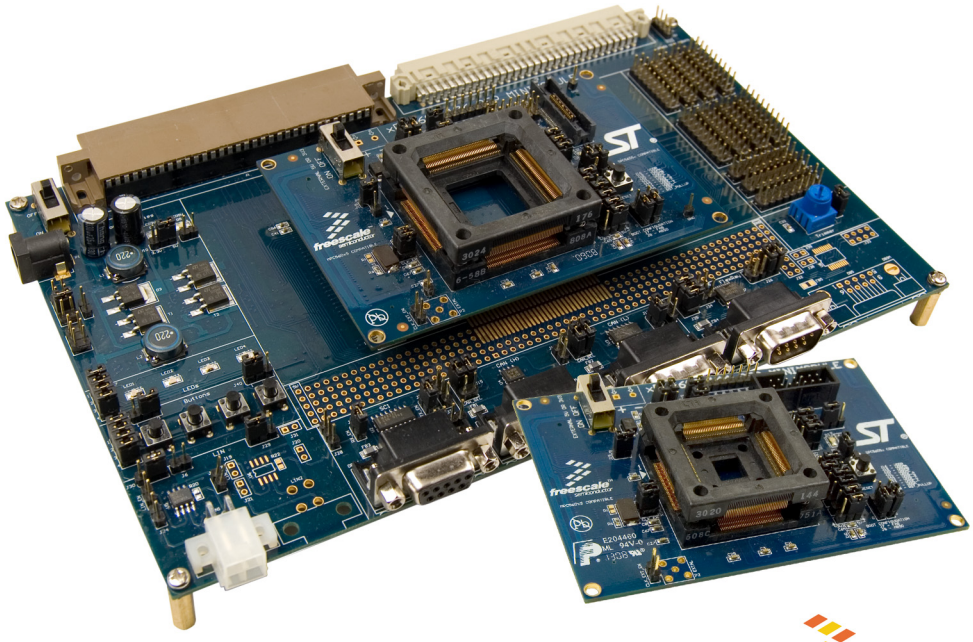
XPC560S EVB User Manual



XPC560SEVBUM
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1 OVERVIEW

The xPC560S EVB is an evaluation system supporting Freescale MPC560xS microprocessors. The complete system consists of an xPC56XXMB Motherboard and an xPC560SADPT Mini-Module which plugs into the motherboard. Different Mini-Modules are available for evaluating devices with different footprints in the MPC560xS family of microprocessors. The evaluation system allows full access to the CPU, all of the CPU's I/O signals, and the motherboard peripherals (such as CAN, SCI, LIN). The Mini-Module may be used as a stand-alone unit, which allows access to the CPU, but no access to the I/O pins or any motherboard peripherals.

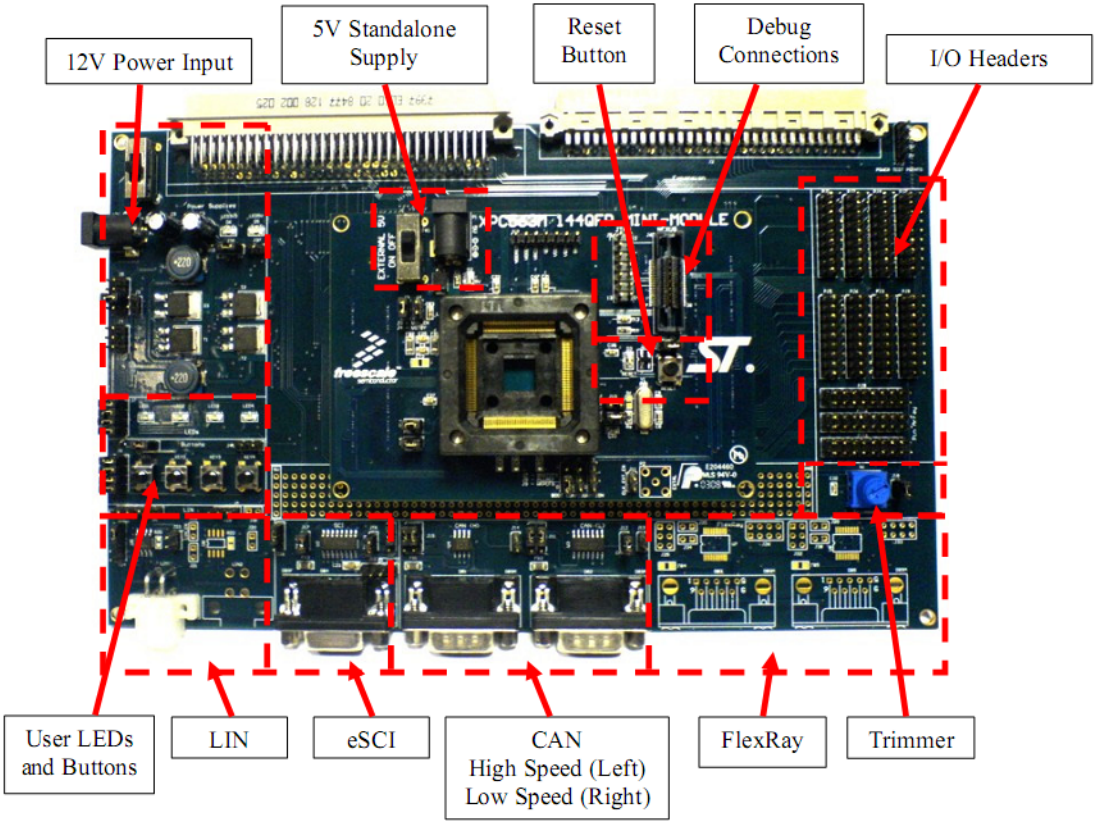

Figure 1-1: Overview of the xPC560S EVB

1.1 Package Contents

An xPC560S Evaluation Kit includes the following items:

- One xPC56XXMB Motherboard
- One xPC560SADPT144S or xPC560SADPT176S or xPC560SADPT208S Mini-Module
- One xPC56XX Resources CD-ROM
- One P&E USB-ML-PPCNEXUS Hardware Interface Cable
- One USB A-to-B Cable
- Freescale Warranty Card

An xPC560S Adapter Package includes the following items:

- One xPC560SADPT144S or xPC560SADPT176S or xPC560SADPT208S Mini-Module
- One xPC56XX Resources CD-ROM
- Freescale Warranty Card

1.2 Supported Devices

The xPC560SADPT144S Mini-Module supports the following devices:

- MPC5606SEMLQ (144LQFP)

The xPC560SADPT176S Mini-Module supports the following devices:

- MPC5606SEMLU (176LQFP)

The xPC560SADPT208S Mini-Module supports the following devices:

- MPC5606SEMMG (208BGA)

1.3 Recommended Materials

- Freescale MPC5606S reference manual and datasheet
- xPC56XXMB schematic
- xPC560SADPT100S schematic
- xPC560SADPT144S schematic
- xPC560SADPT208S schematic

1.4 Handling Precautions

Please take care to handle the package contents in a manner such as to prevent electrostatic discharge.

2 HARDWARE FEATURES

The xPC560S EVB is an evaluation system for Freescale's MPC560xS microprocessors. A 38-pin Mictor Nexus port and/or a 14-pin JTAG port are provided on the Mini-Module to allow usage of an external PowerPC Nexus interface such as P&E USB-ML-PPCNEXUS cable and Cyclone MAX automated programmer.

- **xPC56XXMB Board Features**
  - ON/OFF Power Switch w/ LED indicators
  - A 12VDC power supply input barrel connector
  - Onboard ST Microelectronics L9758 regulator provides three different power voltages simultaneously: 5V, 3.3V, and 1.2V
  - Onboard peripherals can be configured to operate at 5V or 3.3V logic levels
  - Two CAN channels with jumper enables
    - One CAN channel with High-Speed transceiver and DB9 male connector
    - One CAN channel with Low-Speed Fault Tolerant and High-Speed transceiver (selectable with jumpers) and DB9 male connector
  - Two LIN channels with jumper enables
    - One channel with transceiver and pin header connector populated
    - One channel with footprints only
  - One SCI channel with jumper enables
    - Transceiver with DB9 female connector
  - Two FlexRay channels with jumper enables
    - One channel with transceiver and DB9 male connector
    - One channel with footprint only
  - Four user push buttons with jumper enables and 0 or 1 forcing configurable

- Four user LED's with jumper enables
- One potentiometer for analog voltage input
- Pin array for accessing all I/O signals
- Expansion connectors for accessing all I/O signals
- Development zone with 0.1" spacing and SOIC footprint prototyping
- Specifications:
  - Board Size 5.5" x 9.0"
  - 12VDC Center Positive power supply with 2.5/5.5mm barrel connector

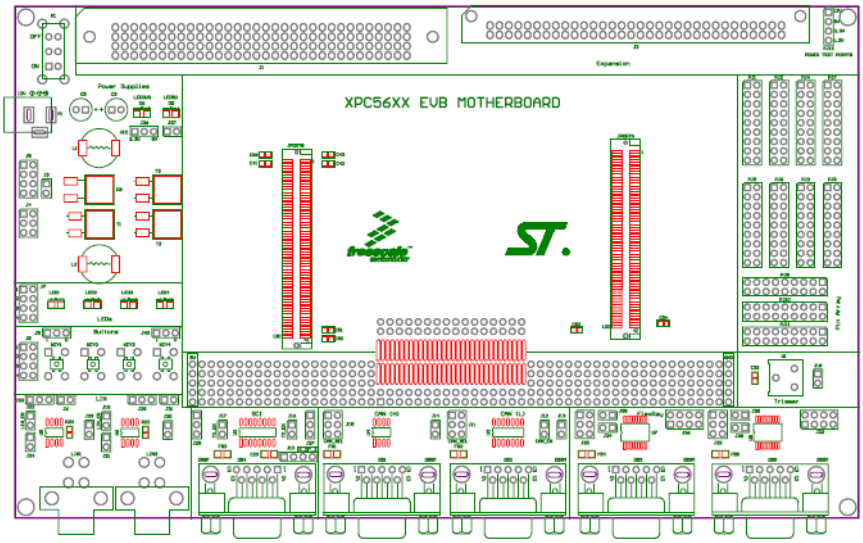

Figure 2-1: xPC56XXMB Top Component Placement

2.1 xPC560SADPT Mini-Module Board Features

- Can be used as a stand-alone board by providing external 5V power supply input
- ON/OFF Power Switch w/ LED indicator
- Reset button with filter and LED indicator

- xPC560SADPT100S has socket for MPC560xS in 100LQFP footprint
- xPC560SADPT144S has socket for MPC560xS in 144LQFP footprint
- xPC560SADPT208S has socket for MPC560xS in 208BGA footprint
- Debug ports: 38-pin Mictor Nexus port and/or 14-pin JTAG port
- Direct clock input through SMA connector (footprint only)
- Jumpers for boot configuration

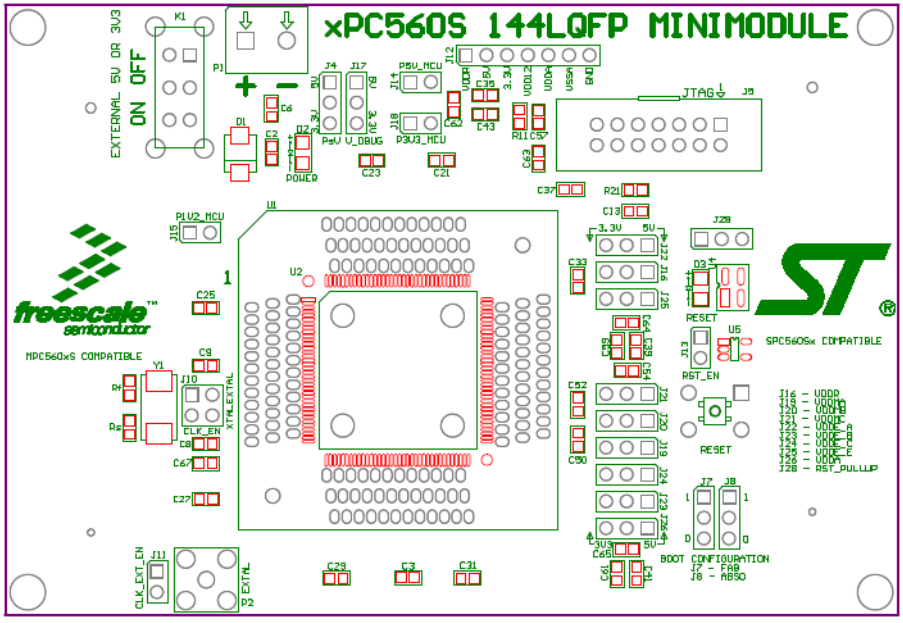

Figure 2-2: xPC560SADPT144S Top Component Placement

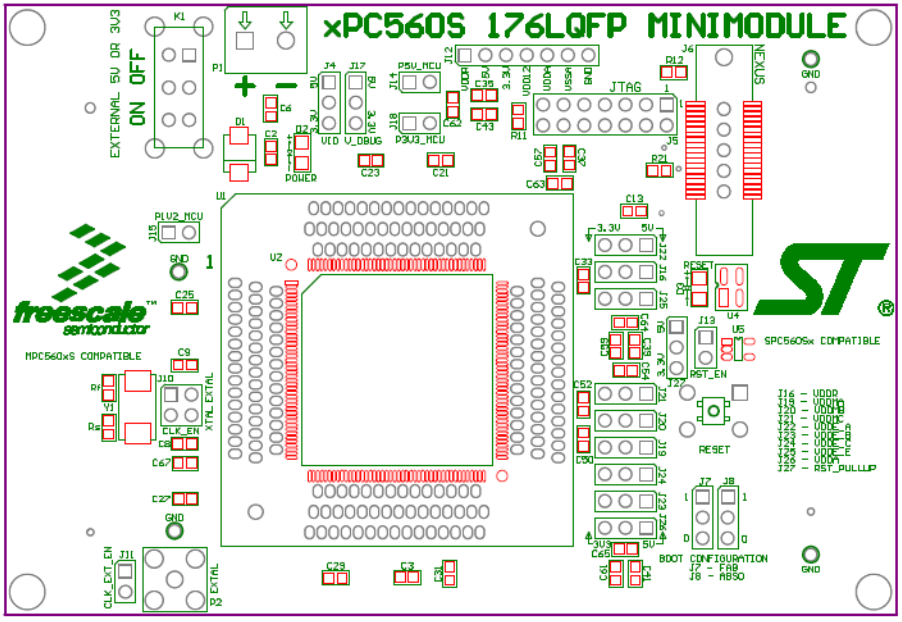

Figure 2-3: xPC560SADPT176S Top Component Placement

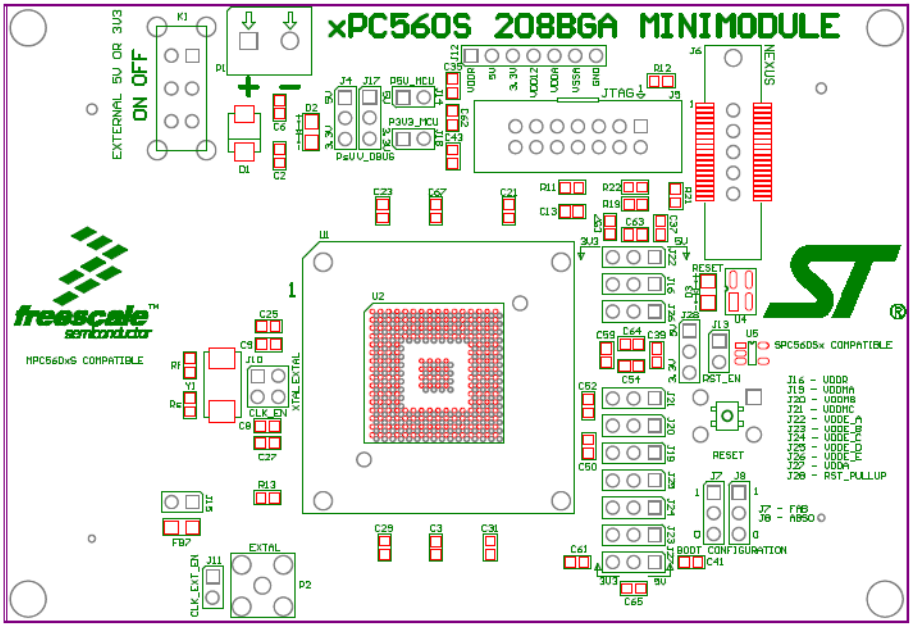

Figure 2-4: xPC560SADPT208S Top Component Placement

2.2 Pin Numbering for Jumpers

Jumpers for both the xPC56XXMB motherboard and the xPC560S Mini-Modules have a rounded corner to indicate the position of pin 1. See examples below for the numbering convention used in this manual for jumper settings.

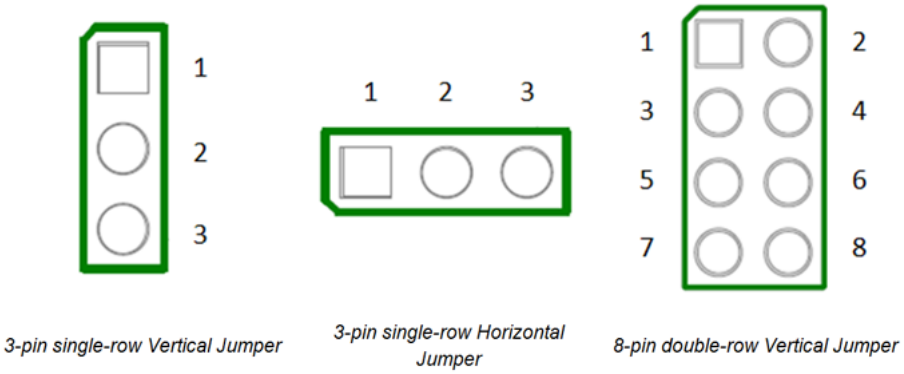

Figure 2-5: Pin Numbering

3 xPC56XXMB HARDWARE & JUMPER SETTINGS

3.1 Power Supplies

The xPC56XXMB obtains its power from the 12VDC Center Positive input barrel connector. The following jumpers are used to configure the power supply output:

J3 – VSA Tracking Regulator Configuration

Jumper Setting	Effect
On	The ST L9758 tracking regulator VSA tracks the input voltage at its TRACK_REF pin.
Off (default)	The ST L9758 tracking regulator VSA tracks 5V

J4 – VPROG Regulators Control

Jumper Setting	Position	Effect
1+2	On	V_{KAM} regulator output is programmed to 1V
	Off (default)	V_{KAM} regulator output is programmed to 1.5V
3+4	On	V_{STBY} regulator output is programmed to 2.6V
	Off (default)	V_{STBY} regulator output is programmed to 3.3V

5+6	On	V_{DLL} regulator output is programmed to 2.6V
	Off (default)	V_{DLL} regulator output is programmed to 3.3V

J5 – Regulators Enable & Standby

Jumper Setting	Position	Effect
1+2	On	The power regulator is always on
	Off (default)	The power regulator is in standby if jumpers 5+6 are also in the “off” position
3+4	On	VSB, VSC, and VSD tracking regulators are disabled
	Off (default)	VSB, VSC, and VSD tracking regulators are enabled
5+6	On (default)	The power regulator is always on
	Off	The power regulator is in standby if jumpers 1+2 are also in the “off” position
7+8	On	V_{DLL} and V_{CORE} regulators are disabled
	Off (default)	V_{DLL} and V_{CORE} regulators are enabled

J36 – VIO Peripherals Logic Level

Jumper Setting	Effect
1+2	Onboard peripherals are configured for 3.3V logic
2+3 (default)	Onboard peripherals are configured for 5V logic

J37 – VBat low voltage detection

Jumper Setting	Effect
On	Low battery detection is enabled
Off (default)	Low battery detection is disabled

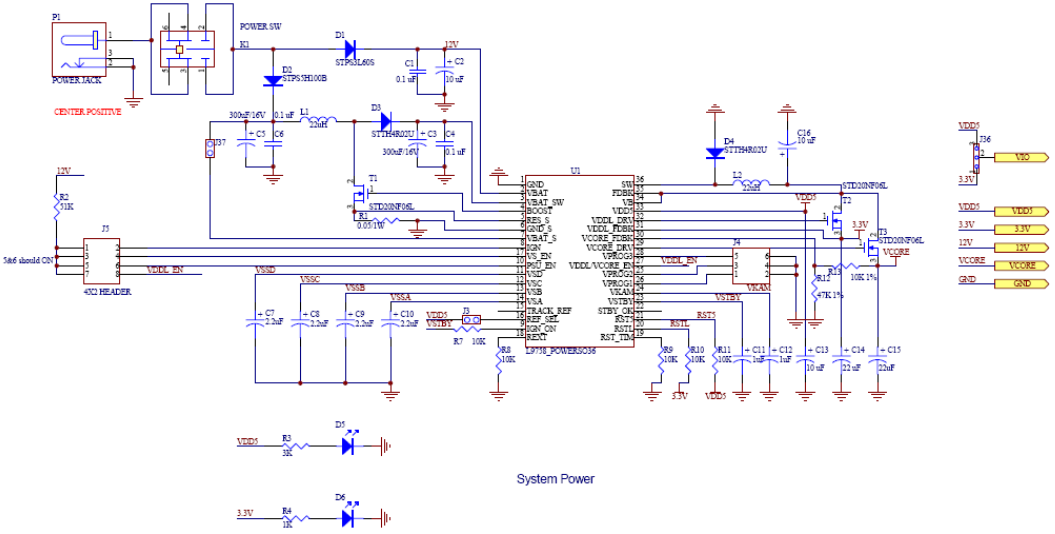

Figure 3-1: Power Supply circuitry schematic

3.2 LEDs

There are four user LEDs available on the xPC56XXMB. All LEDs are active low.

J7 – LEDs Enable

Controls whether the LEDs on the xPC56XXMB motherboard are connected to I/O pins of the processor. The jumpers can be removed and wires can be used to connect each LED to any processor I/O pin, if desired. Please note that although the schematics indicate that the processor I/O pins are eMIOSx, those are not the I/O pins for the xPC560S EVB. The table below has the correct pins listed.

Jumper Setting	Effect
1+2 (default on)	LED1 connected to PE4
3+4 (default on)	LED2 connected to PE5
5+6 (default on)	LED3 connected to PE6
7+8 (default on)	LED4 connected to PE7

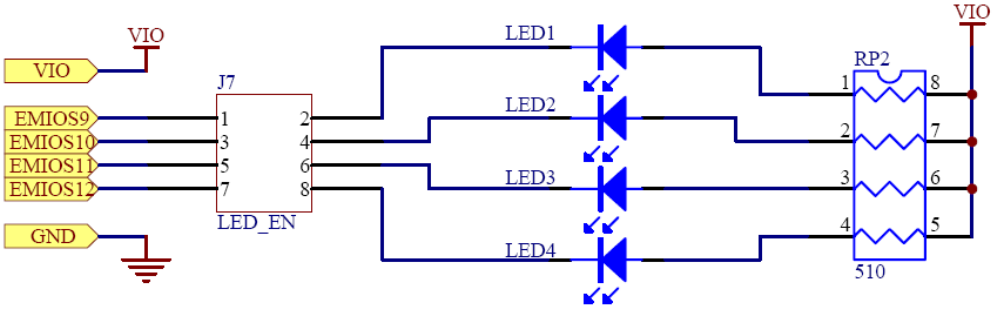

Figure 3-2: LEDs circuitry schematic

3.3 Buttons

There are four user buttons available on the xPC56XXMB.

J8 – Buttons Enable

Controls whether the buttons on the xPC56XXMB motherboard are connected to I/O pins of the processor. The jumpers can be removed and wires can be used to connect each button to any processor I/O pin, if desired. Please note that although the schematics indicate that the processor I/O pins are eMIOSx, those are not the I/O pins for the xPC560S EVB. The table below has the correct pins listed.

Jumper Setting	Effect
1+2 (default on)	KEY1 connected to PE0
3+4 (default on)	KEY2 connected to PE1
5+6 (default on)	KEY3 connected to PE2
7+8 (default on)	KEY4 connected to PE3

J9 – Buttons Driving Configuration

Selects whether the buttons drive logic high or drive logic low when pressed.

Jumper Setting	Effect
1+2	When pressed, buttons will send logic high to the connected I/O pin
2+3 (default)	When pressed, buttons will send logic low to the connected I/O pin

J40 – Buttons Idle Configuration

Selects whether the I/O pins are pulled logic high or pulled logic low. This controls the defaultlogic level of the I/O pins when the buttons are not pressed.

Jumper Setting	Effect
1+2 (default)	I/O pins connected to the buttons are pulled up to logic high
2+3	I/O pins connected to the buttons are pulled down to logic low

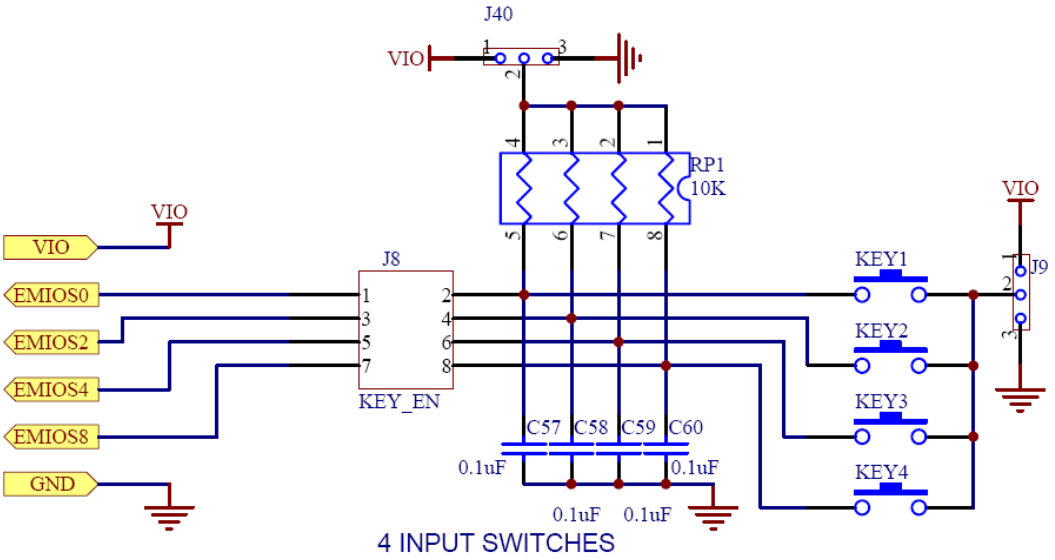

Figure 3-3: Buttons circuitry schematic

3.4 LIN

There are footprints for two LIN connections on the xPC56XXMB. By default, one LIN circuit is assembled (LIN1) and the other circuit is left unpopulated

(LIN2).

J6 – LIN1 pin2 configuration

Jumper Setting	Effect
On	Pin 2 of the LIN1 connector is connected to 12V
Off (default)	Pin 2 of the LIN1 connector is not connected to 12V

J22 – LIN1 enable

Jumper Setting	Effect
On (default)	Enables the LIN1 transceiver
Off	Disables the LIN1 transceiver

J23 – LIN1 master selection

Jumper Setting	Effect
On	LIN1 is configured as a master node
Off (default)	LIN1 is configured as a slave node

J24 – LIN1 pin1 configuration

Jumper Setting	Effect

On	Pin 1 of the LIN1 connector is connected to 12V
Off (default)	Pin 1 of the LIN1 connector is not connected to 12V

J27 – LIN1/SCI TxD selection

Controls whether the TxD pin on LIN1 or SCI is connected to the default I/O pin on the MPC560xS processor.

Jumper Setting	Effect
1+2	The LIN1 TxD pin is connected to the “PB3” pin on the MPC560xS processor. This should be set if enabling LIN1.
2+3	The SCI TxD pin is connected to the “PB3” pin on the MPC560xS processor.

J28 – LIN1/SCI RxD selection

Controls whether the RxD pin on LIN1 or SCI is connected to the default I/O pin on the MPC560xS processor.

Jumper Setting	Effect
1+2	The LIN1 RxD pin is connected to the “PB2” pin on the MPC560xS processor. This should be set if enabling LIN1.
2+3	The SCI RxD pin is connected to the “PB2” pin on the MPC560xS processor.

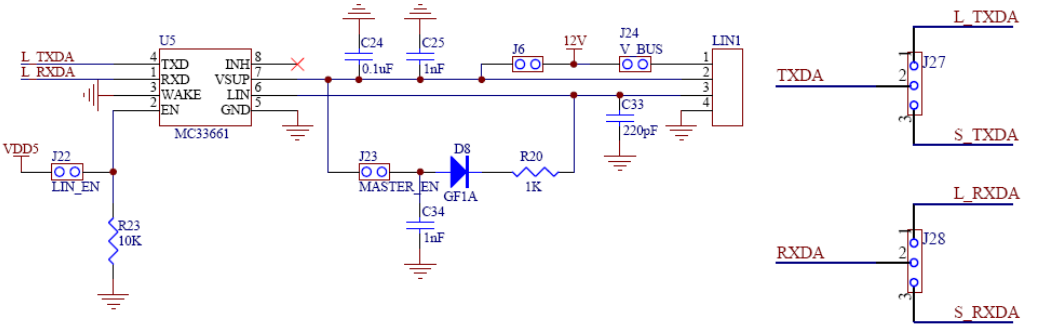

Figure 3-4: LIN1 Schematic

J31 – LIN2 pin2 configuration

Jumper Setting	Effect
On	Pin 2 of the LIN2 connector is connected to 12V
Off (default)	Pin 2 of the LIN2 connector is not connected to 12V

J19 – LIN2 enable

Jumper Setting	Effect
On	Enables the LIN2 transceiver
Off (default)	Disables the LIN2 transceiver

J20 – LIN2 master selection

Jumper Setting	Effect
On	LIN2 is configured as a master node
Off (default)	LIN2 is configured as a slave node

J21 – LIN2 pin1 configuration

Jumper Setting	Effect
On	Pin 1 of the LIN2 connector is connected to 12V
Off (default)	Pin 1 of the LIN2 connector is not connected to 12V

J29 – LIN2/SCI TxD selection

Controls whether the TxD pin on LIN2 or SCI is connected to the default I/O pin on the MPC560xS processor.

Jumper Setting	Effect
1+2	The LIN2 TxD pin is connected to the “PI6” pin on the MPC560xS processor. This should be set if enabling LIN2.
2+3	The SCI TxD pin is connected to the “PI6” pin on the MPC560xS processor.

J30 – LIN2/SCI RxD selection

Controls whether the RxD pin on LIN2 or SCI is connected to the default I/O pin on the MPC560xS processor.

Jumper Setting	Effect
1+2	The LIN2 RxD pin is connected to the “PI7” pin on the MPC560xS processor. This should be set if enabling LIN2.
2+3	The SCI RxD pin is connected to the “PI7” pin on the MPC560xS processor.

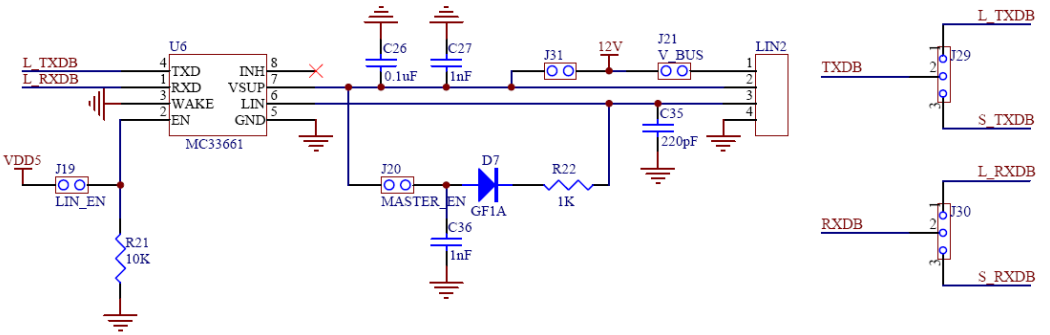

Figure 3-5: LIN2 schematic

SCI

One SCI interface is available on the xPC56XXMB.

J16 – SCI TxD Enable

Jumper Setting	Effect
On (default)	Enables SCI transmit
Off	Disables SCI transmit

J17 – SCI RxD Enable

Jumper Setting	Effect
On (default)	Enables SCI receive
Off	Disables SCI receive

J27 – LIN1/SCI TxD selection

Controls whether the TxD pin on LIN1 or SCI is connected to the default I/O pin on the MPC560xS processor.

Jumper Setting	Effect
1+2	The LIN1 TxD pin is connected to the “PB3” pin on the MPC560xS processor.

2+3	The SCI TxD pin is connected to the “PB3” pin on the MPC560xS processor. This should be set if enabling SCI.

J28 – LIN1/SCI RxD selection

Controls whether the RxD pin on LIN1 or SCI is connected to the default I/O pin on the MPC560xS processor.

Jumper Setting	Effect
1+2	The LIN1 RxD pin is connected to the “PB2” pin on the MPC560xS processor.
2+3	The SCI RxD pin is connected to the “PB2” pin on the MPC560xS processor. This should be set if enabling SCI.

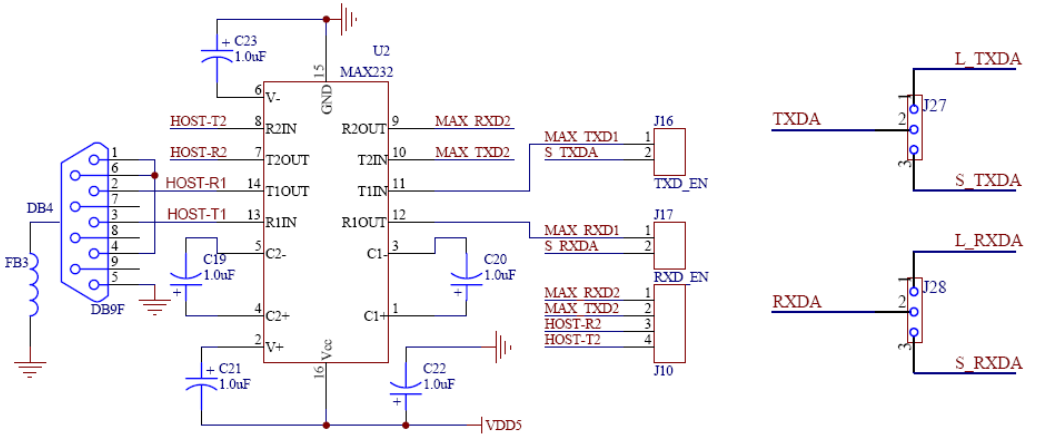

Figure 3-6: SCI schematic

3.5 CAN

Two CAN interfaces are implemented on the xPC56XXMB: a high-speed CAN interface and a low-speed CAN interface.

J14 – CAN (H) Transmit Enable

Jumper Setting	Effect
On	Enables CAN transmission
Off (default)	Disables CAN transmission

J15 – CAN (H) TxD/RxD Enable

Controls which I/O pins on the MPC560xS processor are connected to the TxD and RxD pins on CAN (H).

Jumper Setting	Effect
1+3 (default)	The RxD pin of the CAN (H) interface is connected to the “PB1” pin of the MPC560xS processor.
3+5	The RxD pin of the CAN (H) interface is connected to the “PB10” pin of the MPC560xS processor.
2+4 (default)	The TxD pin of the CAN (H) interface is connected to the “PB0” pin of the MPC560xS processor.
4+6	The TxD pin of the CAN (H) interface is connected to the “PB11” pin of the MPC560xS processor.

J13 – CAN (L) CTE

Jumper Setting	Effect
On	Enables CAN transmission
Off (default)	Disables CAN transmission

J11 – CAN (L) TxD/RxD Enable

Controls which I/O pins on the MPC560xS processor are connected to the TxD and RxD pins on CAN (L).

Jumper Setting	Effect
1+3	The RxD pin of the CAN (L) interface is connected to the “PB1” pin of the MPC560xS processor.
3+5 (default)	The RxD pin of the CAN (L) interface is connected to the “PB10” pin of the MPC560xS processor.
2+4	The TxD pin of the CAN (L) interface is connected to the “PB0” pin of the MPC560xS processor.
4+6 (default)	The TxD pin of the CAN (L) interface is connected to the “PB11” pin of the MPC560xS processor.

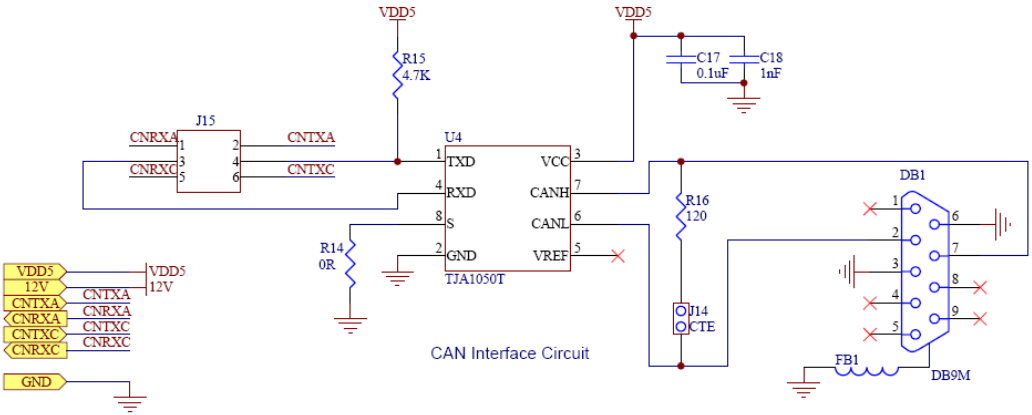

Figure 3-7: High Speed CAN schematic

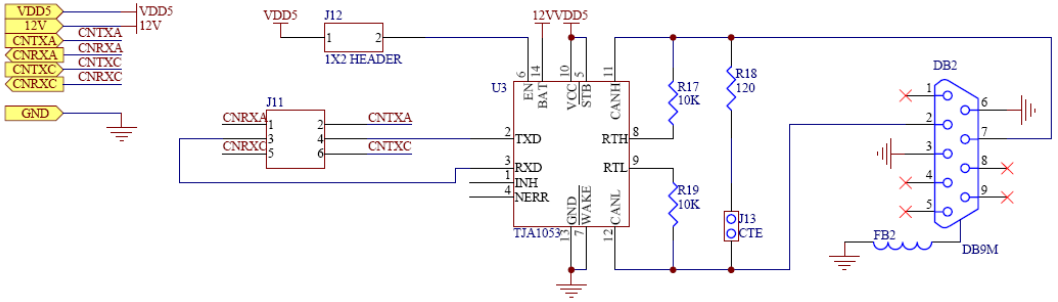

Figure 3-8: Low Speed CAN schematic

3.6 Potentiometer

A potentiometer is available on the xPC56XXMB to allow an analog voltage input.

J18 – POT Enable

Jumper Setting	Effect

On (default)	The potentiometer wiper terminal is connected to the “PB0” pin on the MPC560xS processor.
Off	The potentiometer wiper terminal is left disconnected.

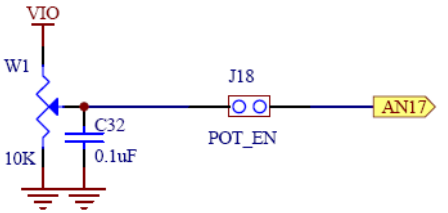

Figure 3-9: Potentiometer schematic

3.7 Pin Mapping

The following is the xPC560S EVB pin assignment for the Pin Array headers:

PJ1

RESET	RESET
CNRX0 - PB1	CNRX1 - PB10
CNTX0 - PB0	CNTX1 - PB11
SIN0 - PB7	SOUT0 - PB8
SCK0 - PB9	PCS01 - PB4
PCS0.2 - PB5	PCS0.3 - PB6
RXD0 - PB2	TXD0 - PB3
RXD1 - PB12	TXD1 - PB13
GND	5V

PJ2 - Port J

PJ0	PJ1
PJ2	PJ3
PJ4	PJ5
PJ6	PJ7
PJ8	PJ9
PJ10	PJ11
PJ12	PJ13
PJ14	PJ15
GND	5V

PJ4 - Port C

PC0	PC1
PC2	PC3
PC4	PC5
PC6	PC7
PC8	PC9
PC10	PC11
PC12	PC13
PC14	PC15
GND	5V

PJ7 - Port A + K

PA0	PA1
PA2	PA3
PA4	PA5
PA6	PA7
PA8	PA9
PA10	PA11
PA12	PA13
PA14	PA15
PK0	PK1

PJ5 - Port B

PB0	PB1
PB2	PB3
PB4	PB5
PB6	PB7
PB8	PB9
PB10	PB11
PB12	PB13
PB14	PB15
GND	5V

PJ6 - Port C

PI0	PI1
PI2	PI3
PI4	PI5
PI6	PI7
PI8	PI9
PI10	PI11
PI12	PI13
PI14	PI15
GND	5V

PJ3 - Port D

PD0	PD1
PD2	PD3
PD4	PD5
PD6	PD7
PD8	PD9
PD10	PD11
PD12	PD13
PD14	PD15
GND	5V

PJ8 - Port E

PE0	PE1
PE2	PE3
PE4	PE5
PE6	PE7
PE8	PE9
PE10	PE12
PE11	PE13
PE14	PE15
GND	5V

PJ9 - Port F

GND	PF14	PF12	PF10	PF8	PF6	PF4	PF2	PF0
5V	PF15	PF13	PF11	PF9	PF7	PF5	PF3	PF1

PJ10 - Port G

GND	PG14	PG12	PG10	PG8	PG6	PG4	PG2	PG0
5V	PG15	PG13	PG11	PG9	PG7	PG5	PG3	PG1

PJ11 - Port H

GND	PH14	PH12	PH10	PH8	PH6	PH4	PH2	PH0
5V	PH15	PH13	PH11	PH9	PH7	PH5	PH3	PH1

Figure 3-10: Pin Mapping

4 xPC560SADPT144S HARDWARE & JUMPER SETTINGS

4.1 Boot Configuration

The following jumpers affect the operation of the processor as it initially comes out of the reset state:

J7 – FABM Configuration

Controls whether the processor boots from internal FLASH or from a serial interface (CAN, SCI)

Jumper Setting	Effect
1+2	The MPC560xS processor uses serial boot mode
2+3 (default)	The MPC560xS processor uses internal boot mode

J8 – ABS0 Configuration

If J7 is configured for serial boot mode, this jumper selects between UART or CAN. If J7 is configured for internal boot mode, this jumper has no effect.

Jumper Setting	Effect
1+2	The MPC560xS processor uses the CAN interface for serial boot mode
2+3 (default)	The MPC560xS processor uses the UART interface for serial boot mode

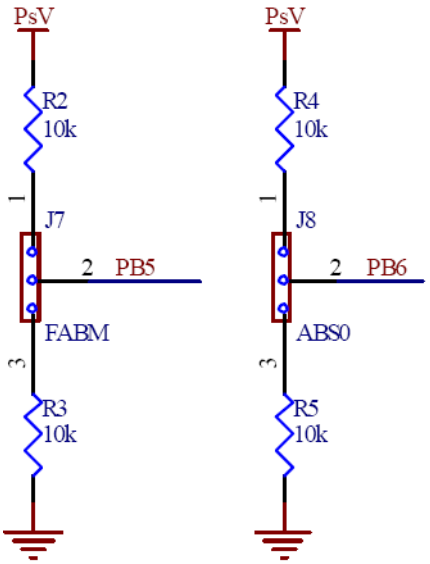

Figure 4-1: Boot Configuration Jumpers

4.2 Power Configuration

When the xPC560S Mini-Module is plugged into the xPC56XXMB motherboard, power is supplied directly by the motherboard. In this setup, the external power supply input available on the Mini-Module should NOT be used.

When the xPC560S Mini-Module is used as a stand-alone board, an external 5V or 3.3V power supply must be used. Note that when using the xPC560S Mini-Module as a stand-alone board, only one power supply is available (5V or 3.3V), and all appropriate jumpers must be configured to use that power supply.

The following jumpers affect the power supply pins of the MPC560xS processor:

J4 – VIO Voltage Selection

Controls whether certain I/O pins are powered using 5V or 3.3V. In particular,

this controls the voltage of the reset circuit and the logic high voltage for the FABM and ABS0 pins.

Jumper Setting	Effect
1+2 (default)	VIO voltage is 5V
2+3	VIO voltage is 3.3V

J14 – 5V MCU Power Enable

Allows 5V to be selected for the various power pins on the MPC560xS processor.

Jumper Setting	Effect
On (default)	5V is available to power the various power supply pins on the MPC560xS processor
Off	5V cannot be used to power any of the various power supply pins on the MPC560xS processor

J15 – 1.2V Core Voltage Enable

Controls whether power is provided to the “VDD 1V2” pins on the MPC560xS processor.

Jumper Setting	Effect
On (default)	MPC560xS “VDD 1V2” pins are connected to 1.2V power

Off	MPC560xS “VDD 1V2” pins are left disconnected

J17 – Debug Port Voltage Configuration

Sets the logic voltage level on the 14-pin JTAG port and 38-pin MICTOR port (if available). These ports are used by external interface hardware to communicate with the processor.

Jumper Setting	Effect
1+2 (default)	Debug port(s) are configured for 5V logic
2+3	Debug port(s) are configured for 3.3V logic

J18 – 3.3V MCU Power Enable

Allows 3.3V to be selected for the various power pins on the MPC560xS processor.

Jumper Setting	Effect
On (default)	3.3V is available to power the various power supply pins on the MPC560xS processor
Off	3.3V cannot be used to power any of the various power supply pins on the MPC560xS processor

J22 – VDDE_A Voltage Selection

Sets the voltage level on the MPC560xS “VDD_IO_B” and “VDD_IO_C”

power pins.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_IO_B” and “VDD_IO_C” pins are powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_IO_B” and “VDD_IO_C” pins are powered by 3.3V (J18 must be ON)

J16 – VDDR Voltage Selection

Sets the voltage level on the MPC560xS “VDD_IO_A” power pin.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_IO_A” is powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_IO_A” is powered by 3.3V (J18 must be ON)

J25 – VDDE_E Voltage Selection

Sets the voltage level on the MPC560xS “VDD_IO_D” power pin.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_IO_D” is powered by 5V (J14 must be ON)

2+3	MPC560xS “VDD_IO_D” is powered by 3.3V (J18 must be ON)

J21 – VDDMC Voltage Selection

Sets the voltage level on the MPC560xS “VDD_SMD_C” power pin.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_SMD_C” is powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_SMD_C” is powered by 3.3V (J18 must be ON)

J20 – VDDMB Voltage Selection

Sets the voltage level on the MPC560xS “VDD_SMD_B” power pin.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_SMD_B” is powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_SMD_B” is powered by 3.3V (J18 must be ON)

J19 – VDDMA Voltage Selection

Sets the voltage level on the MPC560xS “VDD_SMD_A” power pin.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_SMD_A” is powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_SMD_A” is powered by 3.3V (J18 must be ON)

J24 – VDDE_C Voltage Selection

Sets the voltage level on the MPC560xS “VDD_IO_F” power pin.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_IO_F” is powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_IO_F” is powered by 3.3V (J18 must be ON)

J23 – VDDE_B Voltage Selection

Sets the voltage level on the MPC560xS “VDD_IO_E” power pin.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_IO_E” is powered by 5V (J14 must be ON)

2+3	MPC560xS “VDD_IO_E” is powered by 3.3V (J18 must be ON)

J26 – VDDA Voltage Selection

Sets the voltage level on the MPC560xS “VDD_ADC” power pin.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_ADC” is powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_ADC” is powered by 3.3V (J18 must be ON)

4.3 System Clock Configuration

The xPC560S Mini-Modules support the usage of crystal clock sources as well as external clock sources.

J10 – Crystal clock source enable

Both of the jumpers below need to be installed to enable the crystal clock source.

Jumper Setting	Effect
1+2 (default)	The MPC560xS “EXTAL” signal is connected to the crystal clock source on the xPC560S Mini-Module
3+4 (default)	The MPC560xS “XTAL” signal is connected to the crystal clock source on the xPC560S Mini-Module

J11 – External clock source enable

The xPC560S Mini-Module contains a footprint for an SMA connector, which can be used to provide an external clock source to the system.

Jumper Setting	Effect
On	The MPC560xS “EXTAL” signal is connected to the SMA connector on the xPC560S Mini-Module
Off (default)	The SMA connector on the xPC560S Mini-Module is disconnected from the processor

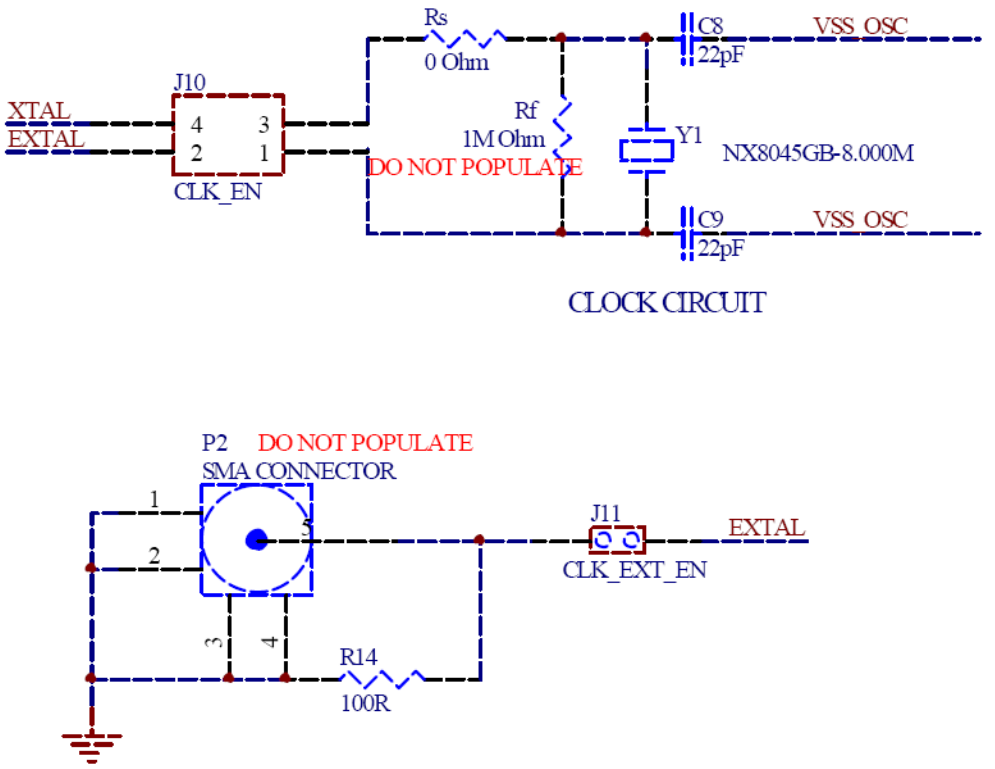

Figure 4-2: System Clock schematic

4.4 General Configuration

J13 – Reset Enable

A RESET push button on the xPC560S Mini-Module can be used to reset the processor.

Jumper Setting	Effect

On (default)	The RESET button on the xPC560S Mini-Module is enabled
Off	The RESET button on the xPC560S Mini-Module is disabled

J28 – Reset Pullup

The RESET signal of the MPC560xS processor can be pulled up to a logic high voltage.

Jumper Setting	Effect
1+2	The RESET signal on the MPC560xS processor is pulled up to 5V
2+3	The RESET signal on the MPC560xS processor is pulled up to 3.3V

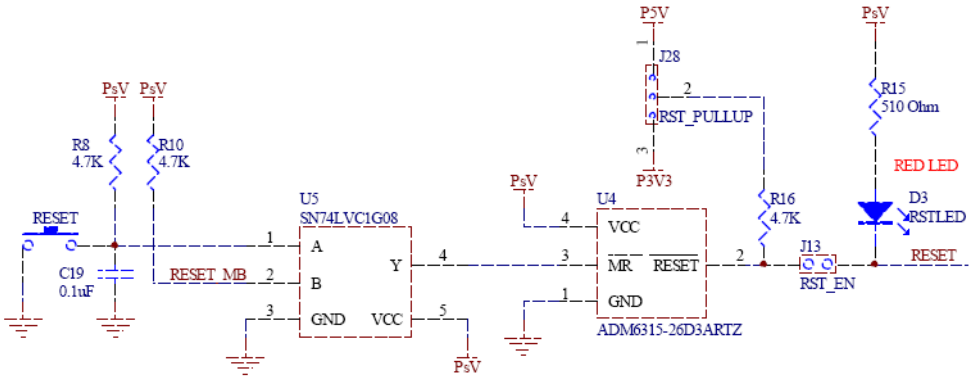

Figure 4-3: Reset circuitry schematic

5 xPC560SADPT176S HARDWARE & JUMPER SETTINGS

5.1 Boot Configuration

The following jumpers affect the operation of the processor as it initially comes out of the reset state:

J7 – FABM Configuration

Controls whether the processor boots from internal FLASH or from a serial interface (CAN, SCI)

Jumper Setting	Effect
1+2	The MPC560xS processor uses serial boot mode
2+3 (default)	The MPC560xS processor uses internal boot mode

J8 – ABS0 Configuration

If J7 is configured for serial boot mode, this jumper selects between UART or CAN. If J7 is configured for internal boot mode, this jumper has no effect.

Jumper Setting	Effect
1+2	The MPC560xS processor uses the CAN interface for serial boot mode
2+3 (default)	The MPC560xS processor uses the UART interface for serial boot mode

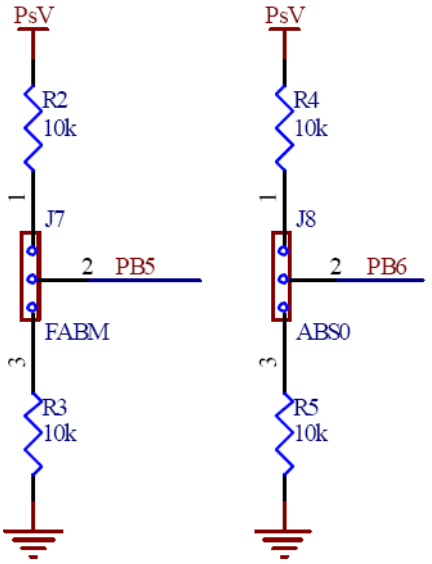

Figure 5-1: Boot Configuration Jumpers

5.2 Power Configuration

When the xPC560S Mini-Module is plugged into the xPC56XXMB motherboard, power is supplied directly by the motherboard. In this setup, the external power supply input available on the Mini-Module should NOT be used.

When the xPC560S Mini-Module is used as a stand-alone board, an external 5V or 3.3V power supply must be used. Note that when using the xPC560S Mini-Module as a stand-alone board, only one power supply is available (5V or 3.3V), and all appropriate jumpers must be configured to use that power supply.

The following jumpers affect the power supply pins of the MPC560xS processor:

J4 – VIO Voltage Selection

Controls whether certain I/O pins are powered using 5V or 3.3V. In particular,

this controls the voltage of the reset circuit and the logic high voltage for the FABM and ABS0 pins.

Jumper Setting	Effect
1+2 (default)	VIO voltage is 5V
2+3	VIO voltage is 3.3V

J14 – 5V MCU Power Enable

Allows 5V to be selected for the various power pins on the MPC560xS processor.

Jumper Setting	Effect
On (default)	5V is available to power the various power supply pins on the MPC560xS processor
Off	5V cannot be used to power any of the various power supply pins on the MPC560xS processor

J15 – 1.2V Core Voltage Enable

Controls whether power is provided to the “VDD 1V2” pins on the MPC560xS processor.

Jumper Setting	Effect
On (default)	MPC560xS “VDD 1V2” pins are connected to 1.2V power

Off	MPC560xS “VDD 1V2” pins are left disconnected

J17 – Debug Port Voltage Configuration

Sets the logic voltage level on the 14-pin JTAG port and 38-pin MICTOR port (if available). These ports are used by external interface hardware to communicate with the processor.

Jumper Setting	Effect
1+2 (default)	Debug port(s) are configured for 5V logic
2+3	Debug port(s) are configured for 3.3V logic

J18 – 3.3V MCU Power Enable

Allows 3.3V to be selected for the various power pins on the MPC560xS processor.

Jumper Setting	Effect
On (default)	3.3V is available to power the various power supply pins on the MPC560xS processor
Off	3.3V cannot be used to power any of the various power supply pins on the MPC560xS processor

J22 – VDDE_A Voltage Selection

Sets the voltage level on the MPC560xS “VDD_IO_B”, “VDD_IO_C”, and

"VDD_IO_G" power pins.

Jumper Setting	Effect
1+2 (default)	MPC560xS "VDD_IO_B", "VDD_IO_C", and "VDD_IO_G" pins are powered by 5V (J14 must be ON)
2+3	MPC560xS "VDD_IO_B", "VDD_IO_C", and "VDD_IO_G" pins are powered by 3.3V (J18 must be ON)

J16 – VDDR Voltage Selection

Sets the voltage level on the MPC560xS "VDD_IO_A" power pin.

Jumper Setting	Effect
1+2 (default)	MPC560xS "VDD_IO_A" is powered by 5V (J14 must be ON)
2+3	MPC560xS "VDD_IO_A" is powered by 3.3V (J18 must be ON)

J25 – VDDE_E Voltage Selection

Sets the voltage level on the MPC560xS "VDD_IO_D" power pin.

Jumper Setting	Effect

1+2 (default)	MPC560xS “VDD_IO_D” is powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_IO_D” is powered by 3.3V (J18 must be ON)

J21 – VDDMC Voltage Selection

Sets the voltage level on the MPC560xS “VDD_SMD_C” power pin.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_SMD_C” is powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_SMD_C” is powered by 3.3V (J18 must be ON)

J20 – VDDMB Voltage Selection

Sets the voltage level on the MPC560xS “VDD_SMD_B” power pin.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_SMD_B” is powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_SMD_B” is powered by 3.3V (J18 must be ON)

J19 – VDDMA Voltage Selection

Sets the voltage level on the MPC560xS “VDD_SMD_A” power pin.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_SMD_A” is powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_SMD_A” is powered by 3.3V (J18 must be ON)

J24 – VDDE_C Voltage Selection

Sets the voltage level on the MPC560xS “VDD_IO_F” power pin.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_IO_F” is powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_IO_F” is powered by 3.3V (J18 must be ON)

J23 – VDDE_B Voltage Selection

Sets the voltage level on the MPC560xS “VDD_IO_A” and “VDD_IO_E” power pins.

Jumper Setting	Effect

1+2 (default)	MPC560xS “VDD_IO_A” and “VDD_IO_E” are powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_IO_A” and “VDD_IO_E” are powered by 3.3V (J18 must be ON)

J26 – VDDA Voltage Selection

Sets the voltage level on the MPC560xS “VDD_ADC” power pin.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_ADC” is powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_ADC” is powered by 3.3V (J18 must be ON)

5.3 System Clock Configuration

The xPC560S Mini-Modules support the usage of crystal clock sources as well as external clock sources.

J10 – Crystal clock source enable

Both of the jumpers below need to be installed to enable the crystal clock source.

Jumper Setting	Effect
1+2 (default)	The MPC560xS “EXTAL” signal is connected to the crystal clock source on the xPC560S Mini-Module

3+4 (default)	The MPC560xS “XTAL” signal is connected to the crystal clock source on the xPC560S Mini-Module

J11 – External clock source enable

The xPC560S Mini-Module contains a footprint for an SMA connector, which can be used to provide an external clock source to the system.

Jumper Setting	**Effect**
On	The MPC560xS “EXTAL” signal is connected to the SMA connector on the xPC560S Mini-Module
Off (default)	The SMA connector on the xPC560S Mini-Module is disconnected from the processor

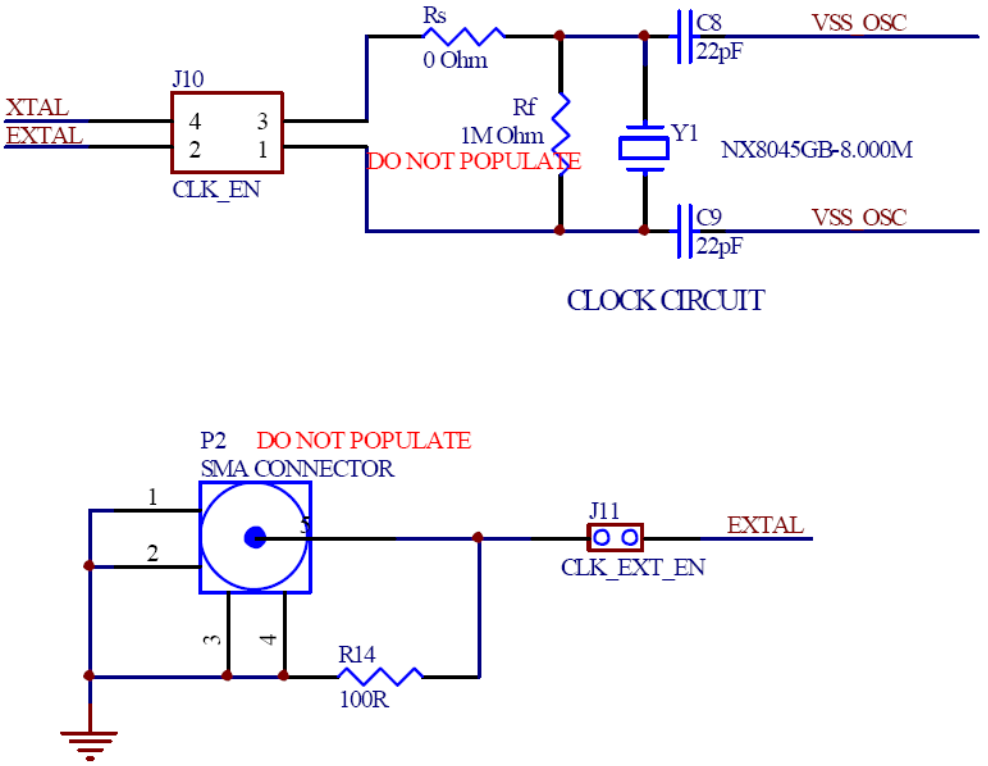

Figure 5-2: System Clock schematic

5.4 General Configuration

J13 – Reset Enable

A RESET push button on the xPC560S Mini-Module can be used to reset the processor.

Jumper Setting	Effect

On (default)	The RESET button on the xPC560S Mini-Module is enabled
Off	The RESET button on the xPC560S Mini-Module is disabled

J27 – Reset Pullup

The RESET signal of the MPC560xS processor can be pulled up to a logic high voltage.

Jumper Setting	Effect
1+2	The RESET signal on the MPC560xS processor is pulled up to 5V
2+3	The RESET signal on the MPC560xS processor is pulled up to 3.3V

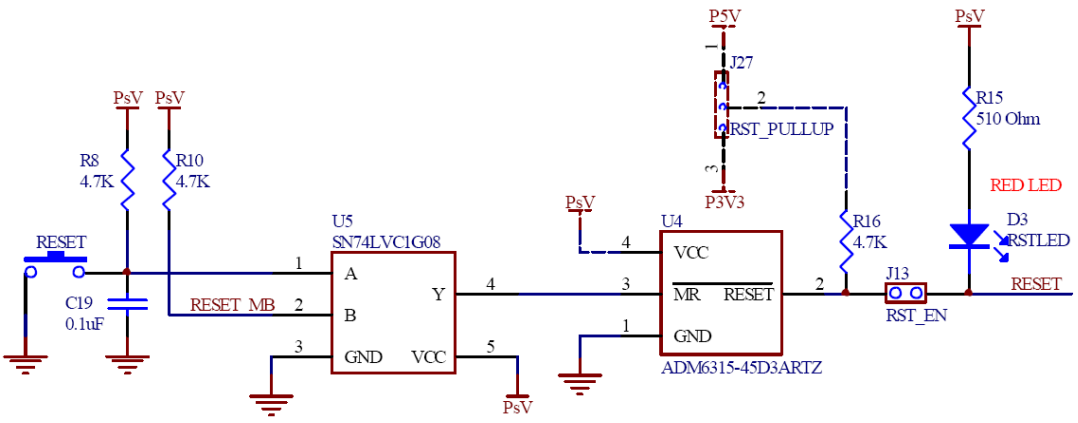

Figure 5-3: Reset circuitry schematic

6 xPC560SADPT208S HARDWARE & JUMPER SETTINGS

6.1 Boot Configuration

The following jumpers affect the operation of the processor as it initially comes out of the reset state:

J7 – FABM Configuration

Controls whether the processor boots from internal FLASH or from a serial interface (CAN, SCI)

Jumper Setting	Effect
1+2	The MPC560xS processor uses serial boot mode
2+3 (default)	The MPC560xS processor uses internal boot mode

J8 – ABS0 Configuration

If J7 is configured for serial boot mode, this jumper selects between UART or CAN. If J7 is configured for internal boot mode, this jumper has no effect.

Jumper Setting	Effect
1+2	The MPC560xS processor uses the CAN interface for serial boot mode
2+3 (default)	The MPC560xS processor uses the UART interface for serial boot mode

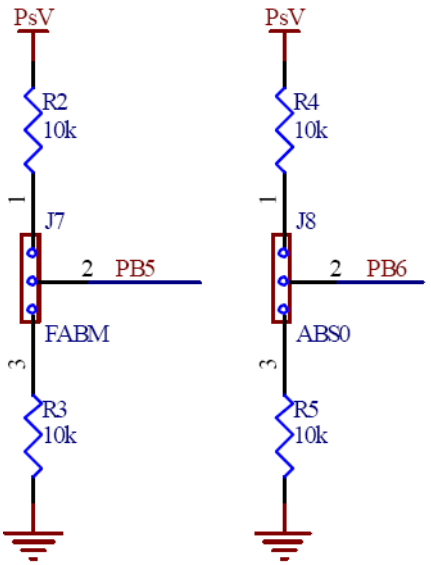

Figure 6-1: Boot Configuration Jumpers

6.2 Power Configuration

When the xPC560S Mini-Module is plugged into the xPC56XXMB motherboard, power is supplied directly by the motherboard. In this setup, the external power supply input available on the Mini-Module should NOT be used.

When the xPC560S Mini-Module is used as a stand-alone board, an external 5V or 3.3V power supply must be used. Note that when using the xPC560S Mini-Module as a stand-alone board, only one power supply is available (5V or 3.3V), and all appropriate jumpers must be configured to use that power supply.

The following jumpers affect the power supply pins of the MPC560xS processor:

J4 – VIO Voltage Selection

Controls whether certain I/O pins are powered using 5V or 3.3V. In particular, this controls the voltage of the reset circuit and the logic high voltage for the

FABM and ABS0 pins.

Jumper Setting	Effect
1+2 (default)	VIO voltage is 5V
2+3	VIO voltage is 3.3V

J14 – 5V MCU Power Enable

Allows 5V to be selected for the various power pins on the MPC560xS processor.

Jumper Setting	Effect
On (default)	5V is available to power the various power supply pins on the MPC560xS processor
Off	5V cannot be used to power any of the various power supply pins on the MPC560xS processor

J15 – 1.2V Core Voltage Enable

Controls whether power is provided to the “VDD 1V2” pins on the MPC560xS processor.

Jumper Setting	Effect
On (default)	MPC560xS “VDD 1V2” pins are connected to 1.2V power
Off	MPC560xS “VDD 1V2” pins are left disconnected

J17 – Debug Port Voltage Configuration

Sets the logic voltage level on the 14-pin JTAG port and 38-pin MICTOR port (if available). These ports are used by external interface hardware to communicate with the processor.

Jumper Setting	Effect
1+2 (default)	Debug port(s) are configured for 5V logic
2+3	Debug port(s) are configured for 3.3V logic

J18 – 3.3V MCU Power Enable

Allows 3.3V to be selected for the various power pins on the MPC560xS processor.

Jumper Setting	Effect
On (default)	3.3V is available to power the various power supply pins on the MPC560xS processor
Off	3.3V cannot be used to power any of the various power supply pins on the MPC560xS processor

J22 – VDDE_A Voltage Selection

Sets the voltage level on the MPC560xS “VDD_IO_B”, “VDD_IO_C”, and “VDD_IO_G” power pins.

Jumper Setting	Effect

1+2 (default)	MPC560xS “VDD_IO_B”, “VDD_IO_C”, and “VDD_IO_G” pins are powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_IO_B”, “VDD_IO_C”, and “VDD_IO_G” pins are powered by 3.3V (J18 must be ON)

J16 – VDDR Voltage Selection

Sets the voltage level on the MPC560xS “VDD_IO_A” power pin.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_IO_A” is powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_IO_A” is powered by 3.3V (J18 must be ON)

J26 – VDDE_E Voltage Selection

Sets the voltage level on the MPC560xS “VDD_IO_D” power pin.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_IO_D” is powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_IO_D” is powered by 3.3V (J18 must be ON)

J21 – VDDMC Voltage Selection

Sets the voltage level on the MPC560xS “VDD_SMD_C” power pin.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_SMD_C” is powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_SMD_C” is powered by 3.3V (J18 must be ON)

J20 – VDDMB Voltage Selection

Sets the voltage level on the MPC560xS “VDD_SMD_B” power pin.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_SMD_B” is powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_SMD_B” is powered by 3.3V (J18 must be ON)

J19 – VDDMA Voltage Selection

Sets the voltage level on the MPC560xS “VDD_SMD_A” power pin.

Jumper Setting	Effect

1+2 (default)	MPC560xS “VDD_SMD_A” is powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_SMD_A” is powered by 3.3V (J18 must be ON)

J24 – VDDE_C Voltage Selection

Sets the voltage level on the MPC560xS “VDD_IO_F” power pin.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_IO_F” is powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_IO_F” is powered by 3.3V (J18 must be ON)

J23 – VDDE_B Voltage Selection

Sets the voltage level on the MPC560xS “VDD_IO_A” and “VDD_IO_E” power pins.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_IO_A” and “VDD_IO_E” are powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_IO_A” and “VDD_IO_E” are powered by 3.3V (J18 must be ON)

J27 – VDDA Voltage Selection

Sets the voltage level on the MPC560xS “VDD_ADC” power pin.

Jumper Setting	Effect
1+2 (default)	MPC560xS “VDD_ADC” is powered by 5V (J14 must be ON)
2+3	MPC560xS “VDD_ADC” is powered by 3.3V (J18 must be ON)

6.3 System Clock Configuration

The xPC560S Mini-Modules support the usage of crystal clock sources as well as external clock sources.

J10 – Crystal clock source enable

Both of the jumpers below need to be installed to enable the crystal clock source.

Jumper Setting	Effect
1+2 (default)	The MPC560xS “OSCIN” signal is connected to the crystal clock source on the xPC560S Mini-Module
3+4 (default)	The MPC560xS “OSCOUT” signal is connected to the crystal clock source on the xPC560S Mini-Module

J11 – External clock source enable

The xPC560S Mini-Module contains a footprint for an SMA connector, which

can be used to provide an external clock source to the system.

Jumper Setting	Effect
On	The MPC560xS “EXTAL” signal is connected to the SMA connector on the xPC560S Mini-Module
Off (default)	The SMA connector on the xPC560S Mini-Module is disconnected from the processor

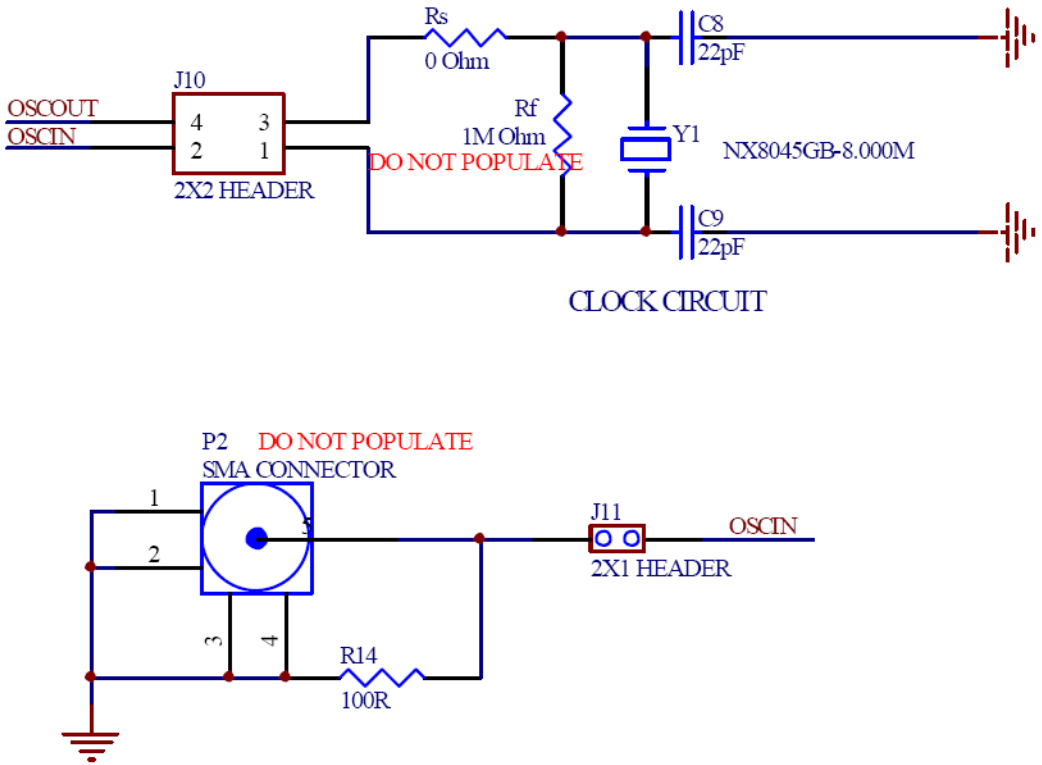

Figure 6-2: System Clock schematic

6.4 General Configuration

J13 – Reset Enable

A RESET push button on the xPC560S Mini-Module can be used to reset the processor.

Jumper Setting	Effect
On (default)	The RESET button on the xPC560S Mini-Module is enabled
Off	The RESET button on the xPC560S Mini-Module is disabled

J28 – Reset Pullup

The RESET signal of the MPC560xS processor can be pulled up to a logic high voltage.

Jumper Setting	Effect
1+2	The RESET signal on the MPC560xS processor is pulled up to 5V
2+3	The RESET signal on the MPC560xS processor is pulled up to 3.3V

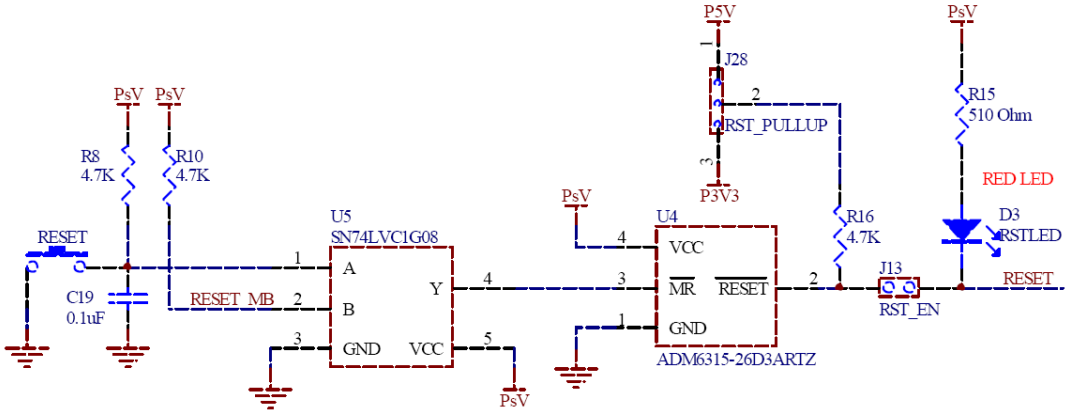

Figure 6-3: Reset circuitry schematic

7 DEBUGGING/PROGRAMMING THE xPC560S EVB

P&E provides hardware and software tools for debugging and programming the xPC560S EVB system.

P&E's USB-ML-PPCNEXUS and Cyclone MAX offer two effective hardware solutions, depending on your needs. The USB-ML-PPCNEXUS is a development tool that will enable you to debug your code and program it onto your target. The Cyclone MAX is a more versatile and robust development tool with advanced features and production programming capabilities, as well as Ethernet support.

More information is available below to assist you in choosing the appropriate development tool for your needs.

7.1 Hardware Solutions At A Glance

The USB-ML-PPCNEXUS offers an affordable and compact solution for your development needs, and allows debugging and programming to be accomplished simply and efficiently. Those doing rapid development will find the USB-ML-PPCNEXUS easy to use and fully capable of fast-paced debugging and programming.

The Cyclone MAX is a more complete solution designed for both development and production. The Cyclone MAX features multiple communications interfaces (including USB, Ethernet, and Serial), stand-alone programming functionality, high speed data transfer, a status LCD, and many other advanced capabilities.

Below is an overview of the features and intended use of the USB-ML-PPCNEXUS and Cyclone MAX.

7.1.1 USB-ML-PPCNEXUS Key Features

- Programming and debugging capabilities
- Compact and lightweight
- Communication via USB 2.0
- Supported by P&E software and Freescale's CodeWarrior

7.1.2 Cyclone MAX Key Features

Advanced programming and debugging capabilities, including:

- PC-Controlled and User-Controlled Stand-Alone Operation

- Interactive Programming via Host PC
- In-Circuit Debugging, Programming, and Testing
- Compatible with Freescale's ColdFireV2/3/4, PowerPC 5xx/8xx/55xx/56xx, and ARM7 microcontroller families
- Communication via USB, Serial, and Ethernet Ports
- Multiple image storage
- LCD screen menu interface
- Supported by P&E software and Freescale's CodeWarrior

7.2 Working With P&E's USB-ML-PPCNEXUS

P&E's USB-ML-PPCNEXUS

7.2.1 Product Features & Implementation

P&E's USB-ML-PPCNEXUS Interface (USB-ML-PPCNEXUS) connects your target to your PC and allows the PC access to the debug mode on Freescale's PowerPC 5xx/8xx/55xx/56xx microcontrollers. It connects between a USB port on a Windows 2000/XP/2003/Vista machine and a standard 14-pin JTAG/Nexus connector on the target.

By using the USB-ML-PPCNEXUS Interface, the user can take advantage of the background debug mode to halt normal processor execution and use a PC to control the processor. The user can then directly control the target's execution, read/write registers and memory values, debug code on the processor, and program internal or external FLASH memory devices. The USB-ML-PPCNEXUS enables you to debug, program, and test your code on your board.

7.2.2 Software

The USB-ML-PPCNEXUS Interface works with Codewarrior as well as P&E's

in-circuit debugger and flash programmer to allow debug and flash programming of the target processor. P&E's USB-ML-PPCNEXUS Development Packages come with the USB-ML-PPCNEXUS Interface, as well as flash programming software, in-circuit debugging software, Windows IDE, and register file editor.

7.3 Working With P&E's Cyclone MAX

P&E's Cyclone MAX

7.3.1 Product Features & Implementation

P&E's Cyclone MAX is an extremely flexible tool designed for debugging, testing, and in-circuit flash programming of Freescale's ColdFireV2/3/4, PowerPC 5xx/8xx/55xx/56xx, and ARM7 microcontrollers. The Cyclone MAX connects your target to the PC via USB, Ethernet, or Serial Port and enables you to debug your code, program, and test it on your board. After development is complete the Cyclone MAX can be used as a production tool on your manufacturing floor.

For production, the Cyclone MAX may be operated interactively via Windows-based programming applications as well as under batch or .dll commands from a PC. Once loaded with data by a PC it can be disconnected and operated manually in a stand-alone mode via the LCD menu and control buttons. The Cyclone MAX has over 3Mbytes of non-volatile memory, which allows the on-board storage of multiple programming images. When connected to a PC for programming or loading it can communicate via the ethernet, USB, or serial interfaces.

7.3.2 Software

The Cyclone MAX comes with intuitive configuration software and interactive

programming software, as well as easy to use automated control software. The Cyclone MAX also functions as a full-featured debug interface, and is supported by Freescale's CodeWarrior as well as development software from P&E.

P&E's Cyclone MAX is also available bundled with additional software as part of various Development Packages. In addition to the Cyclone MAX, these Development Packages include in-circuit debugging software, flash programming software, a Windows IDE, and register file editor.

XPC560SEVBUM
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Freescale Controller Continuum

68HC08/S08/RS08/(S)12(X) ColdFire® V1 ColdFire® V2/V3/V4 PowerPC® Nexus® ARM®

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